WHAT IS CLAIMED IS:

1. An adaptive cruise control system for an automotive vehicle, comprising:

an inter-vehicle distance detecting section that detects a presence of a preceding vehicle which is traveling ahead of the vehicle and detects an inter-vehicle distance between the vehicle and the preceding vehicle;

a vehicular velocity detecting section that detects a velocity of at least one of the vehicle and the preceding vehicle;

a target inter-vehicle distance setting section that sets a target inter-vehicle distance on the basis of at least one of the velocities of the vehicle and the preceding vehicle;

a vehicular traveling speed controlling section that controls a traveling state of the vehicle on the basis of the detected inter-vehicle distance and the target inter-vehicle distance; and

a delay providing section that provides a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance at a time of a detection of one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance, the target inter-vehicle distance setting section setting the target inter-vehicle distance on the basis of the detected velocity for which the delay is provided by the delay providing section.

2. An adaptive cruise control system for an automotive vehicle 1, wherein the delay providing section provides a dead time for one of the detected velocities of the vehicle

and preceding vehicle which is used to set the target inter-vehicle distance.

3. An adaptive cruise control system for an automotive vehicle 2, wherein the delay providing section provides a larger dead time for one of the detected velocities of the vehicle and preceding vehicle which is used to set the target inter-vehicle distance as either one of the detected velocities of the vehicle or the preceding vehicle becomes smaller.

4. An adaptive cruise control system for an automotive vehicle as claimed in either claim 2 or claim 3, wherein the delay providing section carries out a low-pass filtering for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance and whose value is equal to or lower than a predetermined value.

5. An adaptive cruise control system for an automotive vehicle as claimed in claim 1, wherein the delay providing section carries out a low-pass filtering for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance.

6. An adaptive cruise control system for an automotive vehicle as claimed in claim 5, wherein a time constant T of the low-pass filter is set to become larger as one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance becomes lower.

7. An adaptive cruise control system for an automotive

vehicle as claimed in either one of claim 5 or claim 6, wherein the delay providing section carries out a low-pass filtering for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance and whose value is equal to or lower than a predetermined value.

8. An adaptive cruise control system for an automotive vehicle as claimed in any one of the preceding claims 1 through 7, wherein the velocity detecting section comprises: a vehicular velocity detecting section that detects the velocity of the vehicle Vc; and a preceding vehicle velocity detecting section that detects the velocity of the preceding vehicle V_F on the basis of a relative velocity Vr of the vehicle to the preceding vehicle and the velocity of the vehicle.

9. An adaptive cruise control system for an automotive vehicle as claimed in claim 4, wherein the delay providing section provides a largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the host vehicle or the preceding vehicle is equal to or lower than a first predetermined velocity value, provides a second largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the vehicle or the preceding vehicle is higher than the first predetermined velocity value but is equal to or lower than a second predetermined velocity value, provides a third largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when

either one of the velocity of the host vehicle or the preceding vehicle is higher than the second predetermined velocity value but is equal to or lower than a third predetermined velocity value, provides a fourth largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the host vehicle or the preceding vehicle is higher than the third predetermined velocity value but is equal to or lower than a fourth predetermined velocity value, and provides a fifth largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the host vehicle or the preceding vehicle is higher than the fourth predetermined velocity value but is equal to or lower than a fifth predetermined velocity value.

10. An adaptive cruise control system for an automotive vehicle as claimed in claim 9, wherein the delay providing section provides a fifth control number of times previously detected velocity of the preceding vehicle V_{FS} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is equal to or lower than the first predetermined velocity value, provides a fourth control number of times previously detected velocity of the preceding vehicle V_{F4} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the first predetermined velocity value but is equal to or lower than the second predetermined velocity value,

provides a third control number of times previously detected velocity of the preceding vehicle V_{F3} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the second predetermined velocity value but is equal to or lower than the third predetermined velocity value, provides a second control number of times previously detected velocity of the preceding vehicle V_{F2} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the third predetermined velocity value but is equal to or lower than the fourth predetermined velocity value, and provides a once control number of time previously detected preceding vehicle V_{F1} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the detected velocity of the preceding vehicle is higher than the fourth predetermined velocity value but is equal to or lower than the fifth predetermined velocity value.

11. An adaptive cruise control system for an automotive vehicle as claimed in claim 10, wherein the target inter-vehicle distance setting section sets the target inter-vehicle distance D* as follows: $D^* = \alpha \cdot V_{FF} + \beta$, wherein V_{FF} denotes the detected velocity of the preceding vehicle for which the delay is processed, α denotes a predetermined inter-vehicle time duration, and β denotes a predetermined distance at a time of a stop of the vehicle to reach to a position of the preceding vehicle and wherein the adaptive cruise control system further comprises: a difference value calculating section that calculates a difference of the set target inter-vehicle distance D* from the detected

inter-vehicle distance D as follows: $\triangle D = D - D^*$; an inter-vehicle distance priority target acceleration/deceleration G_D as follows: $G_D = F_1 \cdot \triangle D$, wherein F_1 denotes a predetermined feedback gain; a target vehicular velocity calculating section that calculates a target velocity of the vehicle Vc* on the basis of a set vehicle speed Vs; a vehicular velocity priority target acceleration/deceleration calculating section that calculates a vehicular velocity priority target acceleration/deceleration G_V on the basis of a difference between the target velocity of the vehicle Vc* and the detected velocity of the vehicle Vc; a target acceleration/deceleration calculating section that calculates a target acceleration/deceleration G* on the basis of the target inter-vehicle distance priority acceleration/deceleration G_D, the vehicular velocity priority acceleration/deceleration G_V, and whether the inter-vehicle distance detecting section detects the presence of the preceding vehicle; and an acceleration controlling section that performs an acceleration control of the vehicle on the basis of the target acceleration/deceleration G*.

12. An adaptive cruise control system for an automotive vehicle as claimed in claim 7, wherein the time constant T of the low-pass filter is set to give a maximum value T_0 for the detected velocity of the vehicle used to set the target inter-vehicle distance when the detected velocity of the vehicle Vc is zero, is set to becomes smaller as the detected velocity of the vehicle Vc is increased, and is set to give zero when the detected velocity of the vehicle Vc becomes equal to the predetermined value.

13. An adaptive cruise control method for an automotive vehicle, comprising:

detecting a presence of a preceding vehicle which is traveling ahead of the vehicle;

detecting an inter-vehicle distance between the vehicle and the preceding vehicle;

detecting a velocity of at least one of the vehicle and the preceding vehicle;

controlling a traveling state of the vehicle on the basis of the detected inter-vehicle distance and a target inter-vehicle distance;

providing a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance at a time of a detection of one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance; and

setting the target inter-vehicle distance on the basis of the detected velocity of one of the vehicle and the preceding vehicle for which the delay is provided.

14. An adaptive cruise control system for an automotive vehicle, comprising:

inter-vehicle distance detecting means for detecting a presence of a preceding vehicle which is traveling ahead of the vehicle and detecting an inter-vehicle distance between the vehicle and the preceding vehicle;

vehicular velocity detecting means for detecting a velocity of at least one of the vehicle and the preceding vehicle;

target inter-vehicle distance setting means for setting a target inter-vehicle distance on the basis of

at least one of the velocities of the vehicle and the preceding vehicle;

vehicular traveling speed controlling means for controlling a traveling state of the vehicle on the basis of the detected inter-vehicle distance and the target inter-vehicle distance; and

delay providing means for providing a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance at a time of a detection of one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance, the target inter-vehicle distance setting means setting the target inter-vehicle distance on the basis of the detected velocity for which the delay is provided by the delay providing means.